



Langley Research Center

NGST Cryogenic Actuators

NGST

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NGST Quarterly Review
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RFO Status

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- **Synopsis posted 8/21-9/21**
- **Comments received (Burleigh, TRW)**
- **RFO solicitation opened to “world”**
- **RFO package sent for final review**



Requirements

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Table 1: Shape and Position Control Actuator Requirements

Property	Type 1		Type 2	
	Requirement	Goal	Requirement	Goal
Resolution (nanometer)	20	10	20	10
Lifecycles	10,000	100,000	10,000	100,000
Stroke (mm)	0.3	0.5	6	10
Operating temperature range, (Kelvin)	20-60	20-300	20-60	20-300
CM Heat dissipation, (milliwatts)	5	0.5	5	0.5
OM Heat dissipation, (milliwatts)	0.05	0.005	0.05	0.005
Mass (grams)	40	20	40	20
Outside Diameter, (cm)	2	1	5	1
Creep, OM (nm/day)	0.1	0.01	0.1	0.01
Thermal stability, OM (nm/K) *	50	20	50	20
Axial Force, set & hold, OM (N)	0.5	1.0	0.5	1.0
Power Consumption, CM, (watt)	1.0	0.1	1.0	0.1
Axial Stiffness, (N/micron)	1.0	1.0	1.0	1.0
Stowed Axial Length, (cm)	10.0	10.0	10.0	10.0



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Table 2: Force Control Actuator Requirements

Property	Type 3	
	Requirement	Goal
Resolution (milliNewton)	4	2
Lifecycles	10,000	100,000
Peak-to-peak Force, (Newton)	4	2
Operating temperature range, (Kelvin)	20-60	20-300
CM Heat dissipation, (milliwatts)	5	0.5
OM Heat dissipation, (milliwatts)	0.05	0.005
Mass (grams)	100	50
Outside Diameter, (cm)	5	2
Thermal stability, OM (mN/K) *	0.6	0.4
Stroke, (mm)	.5	.8
Creep, OM (mN/day)	0.6	0.4
Axial stiffness, OM (N/m)	15	10
Power Consumption, CM, (watt)	1.0	0.1
Stowed Axial Length, (cm)	10.0	10.0



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Table 3: Deformable Mirror Actuator Array Requirements

Property	Type 4	
	Requirement	Goal
Resolution (nanometer)	5	3
Lifecycles	100,000	1,000,000
Stroke (μm)	1	3
Operating temperature range, (Kelvin)	20-60	20-300
CM Heat dissipation, (milliwatts)	5	0.5
OM Heat dissipation, (milliwatts)	0.05	0.005
Mass (grams)	20	10
Array column & row spacing, (mm)	1	0.5
Array size, number of actuators	(10)x(10)	(50)x(50)
Creep, OM (mN/day)	0.6	0.4
Thermal stability, OM (nm/K) *	100	20
Axial Force, OM, (Newton)	0.5	1
Power Consumption, CM, (watt)	1.0	0.1



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Next Quarter Plans

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- Release RFO as soon as we get “green light”
- Evaluate, select & negotiate contracts